

What is claimed is:

1. A starter for an internal combustion engine comprising:
 - a housing;
 - 5 a spline tube disposed within said housing, said spline tube having a spline formed in an inner periphery thereof;
 - at least two bearings working to support an outer periphery of said spline tube;
 - a starter output shaft having a spline which is slidable
 - 10 engagement with the spline of said spline tube, said starter output shaft having a pinion which is provided on an end portion of said starter output shaft cantilevered by one of said bearings and which works to mesh with a ring gear of an engine for outputting torque produced by a motor to start the engine;
 - 15 at least one elongated hole formed in said spline tube;
 - an engagement member engaging said starter output shaft through said elongated hole of said spline tube; and
 - a pinion moving mechanism responsive to activation of the starter to push said engagement member for moving said pinion
 - 20 toward the ring gear along with movement of said engagement member along said elongated hole.
2. A starter as set forth in claim 1, wherein said spline tube is coupled to the motor so that the torque produced by the motor is
- 25 transmitted to said starter output shaft and the pinion through the spline of said spline tube, and further comprising a push

mechanism working to convert the torque of the motor through the pinion moving mechanism into pressure serving to push said starter output shaft disposed within said spline tube.

5 3. A starter as set forth in claim 1, wherein said spline tube is coupled to the motor to transmit the torque produced by the motor to said starter output shaft and the pinion through the spline of said spline tube, and further comprising a push mechanism working to push said engagement member extending from said starter output
10 shaft through said spline tube to move said starter output shaft disposed within said spline tube.

4. A starter as set forth in claim 1, wherein the splines of said spline tube and said starter output shaft are spiral, and wherein
15 said elongated hole extends at an angle to a longitudinal center line of said spline tube which is equivalent to a spiral angle of said splines.

5. A starter as set forth in claim 1, wherein said pinion moving
20 mechanism is implemented by a magnet switch which is electrically energized for moving said starter output shaft toward the ring gear.

6. A starter as set forth in claim 1, wherein if a span between said bearings supporting said spine tube is defined as B , and a
25 distance between one of said bearing close to the pinion and the pinion when the pinion is moved furthest from said housing and

establishes engagement with the ring gear is defined as A , a relation of $A/B < 1$ is satisfied.

7. A starter as set forth in claim 6, wherein said starter output
5 shaft has a length longer than the distance B which is supported in engagement with spline tube.

8. A starter as set forth in claim 1, wherein said spline tube has
a first end portion opposed to a second end portion closer to the
10 pinion, the first end portion serving as a part of a clutch working to transmit the torque of the motor to said spline tube.

9. A starter as set forth in claim 1, further comprising a
planetary reduction gear disposed between an output shaft of the
15 motor and said spline tube.

10. A starter as set forth in claim 1, further comprising a
planetary reduction gear disposed between an output shaft of the
motor and said starter output shaft and a magnet switch disposed
20 on a side of the motor further from said starter output shaft, and wherein said magnet switch produces magnetic force working to hold said engagement member from rotating while allowing said starter output shaft to be pushed to the ring gear through spiral action of the splines of said starter output shaft and said spline tube
25 produced by the torque of the motor.

11. A starter as set forth in claim 3, wherein said push mechanism includes a magnet switch working to produce magnetic force which moves said engagement member through a lever to push the pinion toward the ring gear through said starter output shaft.